

### **REMARKS/ARGUMENTS**

Applicant thanks Examiner for the detailed Office Action dated March 31, 2006. In response to the issues raised, the Applicant offers the following submissions and amendments.

#### **Amendments**

Claim 1 has been amended to incorporate the features of original claim 8. Likewise, claim 12 has been amended to incorporate the features of original claim 19. Claims 8 and 19 have therefore been cancelled.

Claims 1 and 12 also define the simultaneous deposition of the nozzle plate and sidewalls shown in Figures 38 to 45 and described in the corresponding section of the Detailed Description.

Accordingly, the amendments do not add any new matter.

#### **35 U.S.C. §102 - Claims 1, 6, 7, 12, 17 and 18**

Claims 1, 6, 7, 12, 17 and 18 stand rejected for lack of novelty in light of US 4,611,219 to Sugitani et al.

As discussed above, amended claims 1 and 12 now incorporate the features of original claims 8 and 19 respectively. Sugitani does not disclose a chamber with sidewalls formed from an amorphous ceramic material or integrally formed nozzle plate and sidewalls. Accordingly, claims 1 and 12, and therefore their dependent claims 6, 7, 17 and 18, are novel in light of the Sugitani disclosure.

#### **35 U.S.C. §103 - Claims 8 and 19**

Claims 8 and 19 stand rejected as obvious in light of Sugitani in view of US 5,508,236 to Chiang et al. Claims 8 and 19 have been cancelled but effectively recast in independent form in amended claims 1 and 12. The Applicant submits that amended claims 1 and 12 would not have been obvious to the skilled worker in this field.

A circular chamber with sidewalls of an amorphous ceramic and integrally formed nozzle plate is particularly resistant to fatigue failure and other cracking. A circular cross section eliminates any stress concentrating geometries that can provide the site for crack initiation and subsequent propagation with the cyclic loading from the pressure pulse caused by the actuator. An amorphous ceramic material does not have the defects that a crystalline structure. Such defects also act as crack initiation sites in environments subjected to cyclic loading. Simultaneously depositing the sidewalls and the nozzles provide an integral structure that avoids the potential failure points at the junction between separate materials.

The Sugitani printhead has chambers formed from a lamination of several layers. In some of the layers, the individual chambers are defined by circular holes. Hence the Sugitani chambers have, at certain points, a circular cross section. However, the nozzle plate is clearly a separate integer to the layers forming the chamber sidewalls. Likewise, there is no mention of the need to avoid cracking and fatigue failure in MEMS scale structures.

The Chiang reference fails to disclose the benefits of a non-crystalline structure for use in a printhead chamber or indeed any cyclic load environment. The material properties disclosed at column 1 do not mention the fatigue resistance qualities employed in the present invention.

The cited references fail to teach all the elements of amended claims 1 and 12. Accordingly they do not support a §103 rejection.

It is respectfully submitted that the Examiner's objections and rejections have been successfully traversed and the application is now in condition for allowance. Accordingly, favorable reconsideration is courteously solicited.

Very respectfully,

Applicant:



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KIA SILVERBROOK

C/o: Silverbrook Research Pty Ltd  
393 Darling Street  
Balmain NSW 2041, Australia  
Email: [kia.silverbrook@silverbrookresearch.com](mailto:kia.silverbrook@silverbrookresearch.com)  
Telephone: +612 9818 6633  
Facsimile: +61 2 9555 7762